

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF HAWAII

In the Matter of)	
)	
PUBLIC UTILITIES COMMISSION)	DOCKET NO. 2008-0273
)	
Instituting a Proceeding to Investigate)	
the Implementation of Feed-in Tariffs)	
_____)	

**RESPONSES OF
CLEAN ENERGY MAUI LLC
TO INFORMATION REQUESTS OF
DEPARTMENT OF BUSINESS ECONOMIC DEVELOPMENT AND TOURISM,
HECO COMPANIES
AND TAWHIRI POWER LLC**

AND

CERTIFICATE OF SERVICE

CHRIS MENTZEL
Chief Executive Officer
CLEAN ENERGY MAUI LLC
619 Kupulau Dr.
Kihei, Hawaii 96753
Telephone: (808) 214-7678

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**RESPONSES OF CLEAN ENERGY MAUI LLC
TO INFORMATION REQUESTS OF DEPARTMENT OF BUSINESS
ECONOMIC DEVELOPMENT AND TOURISM, HECO COMPANIES AND
TAWHIRI POWER LLC**

CLEAN ENERGY MAUI LLC ("Clean Energy Maui") respectfully submits the following responses to the Information Requests ("IRs") of DEPARTMENT OF BUSINESS ECONOMIC DEVELOPMENT AND TOURISM, HAWAIIAN ELECTRIC COMPANY, INC., MAUI ELECTRIC COMPANY, LIMITED and HAWAII ELECTRIC LIGHT COMPANY, INC. (the "HECO Companies") and TAWHIRI POWER LLC ("Tawhiri") in the above-referenced proceeding:

Responses by Clean Energy Maui to IRs of DBEDT

DBEDT/CLEAN ENERGY MAUI-IR-1

Please provide all the workpapers and data used to determine the proposed feed-in tariff rates in the referenced pages.

Response: The proposed feed-in tariff rates for the following renewable resources and renewable energy generating facilities were obtained from the feed-in tariff schedule in effect in Germany as of September 2008¹, converted from Euros into US Dollars at the exchange rate of €.6812:\$1.0000 quoted as of September 23, 2008²:

Biomass: Wood-Burning Generating Facility
Biogas: Renewable Energy Generating Facility
Geothermal Energy: Renewable Energy Generating Facility
Landfill Gas or Sewage Treatment Gas: Renewable Energy Generating Facility
Hydropower: Renewable Energy Generating Facility
Wind: Offshore Wind Generating Facility
Wind: Onshore Wind Generating Facility

The proposed feed-in tariff rates for Biomass: Non-Wood Burning Generating Facility were furnished by Alexander & Baldwin/Hawaiian Commercial & Sugar Division.

The proposed feed-in tariff rates for Solar Radiation: Photovoltaic Generating Facility for each of the islands were furnished by The Solar Alliance, in consultation with Hawaii Solar Energy Association. These proposed rates represent good faith estimates of 20-year level feed-in tariff rates necessary to attract development capital for projects typical of the Electrical Capacity size ranges shown in Clean Energy Maui's Proposal for a Feed-in Tariff ("Clean Energy Maui FIT Proposal").

On information and belief, the proposed feed-in tariff rates for Solar Radiation: Concentrating Solar Power Facility for each of the islands were furnished by Sopogy, Inc.

¹ The Germany feed-in tariff rates were obtained from the Tables of Renewable Tariffs or Feed-in Tariffs Worldwide published by Wind-Works.org at <http://www.wind-works.org/About-us/Tables-of-Renewable-Tariffs-or-Feed-in-Tariffs-Worldwide.html>

² Yahoo! Finance Currency Converter (September 23, 2008).

DBEDT/CLEAN ENERGY MAUI-IR-2

Please explain what is meant by “ratepayers will save the subsidy cost to ratepayers of renewable energy certificates (RECs) under RPS”.

Response: RPS is a penalty-based system that has never been proven to encourage massive renewable energy development, such as needed to achieve the proposed 40% goal by 2030. FITs on the other hand have been proven to be extraordinarily successful because they drive innovation and investment. They will allow the utility to reach the RPS goal and relieve the utility, and therefore it's ratepayers, from paying for RECs or penalties.

Responses by Clean Energy Maui to IRs of the HECO Companies

HECO/CEM-IR-1

Do you agree that in addition to achieving a greater level of renewable energy for the State, reliability, power quality and ratepayer impacts are important considerations that must be addressed as a part of any feed-in tariff (FIT) design? If not, please discuss why not.

Response: No. A feed-in tariff is a *price* specification designed to economically motivate the rapid development of renewable energy generation. The economic benefits and costs to the public, including ratepayer impacts, of the feed-in tariff, as a price specification, need to be considered in relation to the economic benefits and costs to the public of the competitive bidding framework now in effect for specifying the price of renewable energy.

The feed-in tariff is not a *technical* specification for interconnection of renewable energy generation. Reliability and power quality impacts from the interconnection of renewable energy generation are not, therefore, a consideration in the design of a feed-in tariff, except that Clean Energy Maui's FIT Proposal acknowledges the utility's right to insist that *any* generation – whether economically motivated by the FIT or not -- meet the utility's own technical interconnection requirements *before* the system is interconnected, so that the utility may fulfill its legal obligation to insure that such reliability and power quality are maintained.

HECO/CEM-IR-2

Do you agree that the HECO, MECO and HELCO systems have different technical and reliability considerations? If not, please discuss why not.

Response: Yes.

HECO/CEM-IR-3

Do you agree that due to the existing and/or anticipated levels of intermittent renewable resources on each island system, that there may be technical and/or operational constraints upon the amount of additional intermittent renewable energy that each island system can absorb? If not, please discuss why not.

Response: No. The IR implies that the transmission and distribution capacity cannot be modified or expanded to "absorb" existing and/or anticipated levels of intermittent renewable resources. While there may be *economic* constraints upon the amount of additional intermittent renewable energy that each island electric system can be modified to absorb, Clean Energy Maui is not aware of any insurmountable technical and/or operational constraints upon the amount of additional intermittent renewable energy that each island electric system can be modified to absorb.

For example, huge battery systems could balance out any variabilities in wind and allow for an island to be supplied by 100% wind power. These batteries may be expensive, but don't present technical and/or operational constraints.

HECO/CEM-IR-4

How does your FIT proposal insure that reliability and power quality on each island electric system are maintained?

Response: The IR implies that Clean Energy Maui, as proponent of an FIT proposal, is legally obligated to insure that reliability and power quality on each island system are maintained. The utility, not Clean Energy Maui as proponent of an FIT proposal, is legally obligated to insure that reliability and power quality on each island system are maintained. Clean Energy Maui's FIT proposal insures that such reliability and power quality are maintained by acknowledging the utility's right to insist that *any* generation – whether economically motivated by the FIT or not -- meet the utility's own technical interconnection requirements *before* the system is interconnected, so that the utility may fulfill its legal obligation to insure that such reliability and power quality are maintained.

HECO/CEM-IR-5

What specific data, evaluations, studies or analyses did you rely upon as a part of any conclusion that your FIT proposal insures reliability on each island system? Please provide that data, evaluations, studies and/or analyses to the extent they are available.

Response: The IR implies that Clean Energy Maui, as proponent of an FIT proposal, is legally obligated to insure reliability on each island system. The utility, not Clean Energy Maui as proponent of an FIT proposal, is legally obligated to insure such reliability. Clean Energy Maui's FIT proposal insures such reliability by acknowledging the utility's right to insist that *any* generation – whether economically motivated by the FIT or not -- meet the utility's own technical interconnection requirements *before* the system is interconnected, so that the utility may fulfill its legal obligation to insure such reliability.

Data, evaluations, studies and/or analyses of the kind requested are irrelevant to establishing the points of law that: (1) the utility is legally obligated to insure reliability on each island system, and (2) the utility has a right to insist that any generation – whether economically motivated by the FIT or not -- meet the utility's own technical interconnection requirements before the generation is interconnected, so that the utility may fulfill its legal obligation to insure such reliability.

HECO/CEM-IR-6

As variable generation is presently having an adverse impact on a system's reliability, how would your FIT proposal mitigate any further adverse impacts?

Response: The IR implies that Clean Energy Maui, as proponent of an FIT proposal, is legally obligated to mitigate any adverse impacts on system reliability caused by additions of variable generation that are economically motivated by an FIT. The utility, not Clean Energy Maui as proponent of an FIT proposal, is legally obligated to mitigate

any such impacts. Clean Energy Maui' FIT proposal mitigates any such impacts by acknowledging the utility's right to insist that *any* generation – whether variable or fixed, whether economically motivated by the FIT or not -- meet the utility's own technical interconnection requirements *before* the generation is interconnected, so that the utility may fulfill its legal obligation to mitigate any such impacts.

HECO/CEM-IR-7

Do you agree that your FIT proposal could result in increases in the rates paid by utility ratepayers? If so, what do you view as an acceptable level of increase for each of the utility system's ratepayers? What do you base that opinion on? Please provide any evaluations or analyses or studies used to support this opinion.

Response: Clean Energy Maui' FIT proposal could result in increases or decreases in the rates paid by utility ratepayers. An acceptable level of increases or decreases in such rates is one consistent with rapid development of large-scale renewable energy generation that reduces -- as much as possible and as soon as possible -- the cost to the public of Hawaii's reliance on petroleum for electric power generation.

As we have seen, the current oil-based system can result in sharp increases in the rates paid by utility ratepayers. I am not aware that the current system of fuel surcharges protects the ratepayer in any way from future oil price increases.

One the other hand, Clean Energy Maui' FIT proposal will provide for 20 year flat rates and optimum energy security through rapid development of large-scale renewable energy generation.

HECO/CEM-IR-8

How does your FIT proposal insure that ratepayers within each of the three utility service territories do not receive significant rate increases?

Response: The IR assumes that a FIT proposal that results in no significant rate increases from the addition of renewable energy generation will have the lowest cost to the public, but that assumption ignores the potentially catastrophic cost to the public from a failure to establish a feed-in tariff that encourages rapid development of large-scale renewable energy generation to reduce – as much as possible and as soon as possible – the cost to the public from Hawaii's dependence on petroleum for electric power generation. Clean Energy Maui' FIT Proposal anticipates insignificant rate increases and low cost to the ratepaying public.

Looking to the German model, the cost to each person is about \$1 per month. This is due to the low insolation (less than half of Hawaii, more comparable to Alaska) and the low wind power. Germany had at the end of 2007 a total of 19,460 wind turbines with 22,247 MW rated power that produced 39,500 million kWh. This means that only 20.47% of the rated power was produced. Maui's wind farm produces 48% of the rated power, thanks to excellent wind conditions. Looking at our excellent natural energy resources and the high prices of fuel, I am sure that ratepayers will be pleasantly surprised by the lower rates.

HECO/CEM-IR-9

What specific data, evaluations, studies or analyses did you rely upon as a part of any conclusion that your FIT proposal insures that ratepayers within each of the three utility service territories do not receive significant rate increases? Please provide that data, evaluations, studies and/or analyses to the extent they are available.

Response: See the preceding response.

HECO/CEM-IR-10

Do you agree that competitive bidding can provide benefits to ratepayers? If so, how does your proposal insure that ratepayers receive the benefits that competitive bidding can provide?

Response: Competitive bidding can provide benefits and costs to ratepayers. So can a feed-in tariff. Clean Energy Maui's proposal would replace competitive bidding with a FIT because the total benefits to the public of Clean Energy Maui's proposed FIT are greater than the total benefits to the public of competitive bidding, and because the total costs to the public of Clean Energy Maui's proposed FIT are less than the total costs to the public of competitive bidding.

HECO/CEM-IR-11

Please explain why a feed in tariff should be applied to larger resources, rather than competitively bid to assure ratepayers the lowest prices for significant blocks of renewable energy?

Response: A feed-in tariff should be applied to larger resources, rather than competitive bidding, because feed-in tariffs have proven successful in Germany and other nations in encouraging the rapid development of large-scale renewable energy generation at low cost to the public, whereas competitive bidding has not been proven successful anywhere in encouraging such development.

HECO/CEM-IR-12

Do you agree that if a Renewable Energy Generating Facility is unable to meet the technical requirements set forth in the utilities' rules relating to interconnection with the utility's electric system, that Renewable Energy Generating Facility should not be interconnected with the utility's electric system? If not, please discuss why not.

Response: No. If a Renewable Energy Generating Facility is unable to meet the technical requirements set forth in the utilities' rules relating to interconnection with the utility's electric system, that Renewable Energy Generating Facility *may* not be interconnected with the utility's electric system.

That said, part of the success of the FIT in Germany and elsewhere was the development of standard interconnection rules that were simple and fast to implement.

HECO/CEM-IR-13

Do you agree that, as an electric system must remain in balance, if there is a greater amount of energy being generated in relation to load being served that generation must be reduced or curtailed to achieve system balance (assuming that load cannot be increased)? If not, please describe how the system balance can otherwise be achieved.

Response: The IR is vague and misleading because it does not specify the conditions under which the utility's electric system "must remain in balance."

If the IR means the balance between generation and load that must be maintained to restore the physical stability and operation of the electric system after an outage, then the answer is "Yes."

If the IR means a balance between generation and load that minimizes the utility's operating costs, then the answer is "No" because, while the minimization of such costs through curtailment may be desirable for economic reasons, such minimization is not necessary for the physical stability or "balance" of the electric system.

"System balance" – whether in the physical stability sense or the economic cost minimization sense – can be achieved by curtailment or dispatch of generation or load.

A brief discussion of curtailment and payment for curtailed energy follows.

The rate for a feed-in tariff is calculated in such a way that it allows the developer to reliably make a certain profit. This reliability is what the developer can take to the bank and get financing.

The utility may not always be able to use the provided electricity because of system constraints. This may be during grid malfunctions, rapid ramp-ups of wind, during times of low demand or other situations. In these cases the utility signals to the power producer that energy has to be curtailed and the power producer's circuitry takes the appropriate steps to reduce the amount of power fed into the grid. Alternatively the utility may disconnect the power producer on it's side. Such curtailment always has it's origin in the utility's system constraints. The power producer is not at fault and (for now) the customer demand is not the limiting factor.

Three approaches are proposed:

- 1) The utility pays for all energy produced, regardless of whether it is used or not.
- 2) The utility pays less for the curtailed part of the energy.
- 3) The utility does not pay for curtailed energy and follows certain rules (such as seniority) in deciding which producer to curtail.

From the initial standpoint of the utility, the lowest cost is achieved by choosing option 3. However, when we examine the entire feed-in tariff system, it becomes obvious that the cost of the average curtailment will increase the feed-in tariff price in such a way that the complete costs to the utility are equal in all three approaches. This is because the power

producers are entitled to the same total payment per year, whether they are paid for curtailment or not.

On the other hand, option 2 or 3 make it more difficult for the provider to obtain financing. Investors will look at the curtailment requirement and realize that it presents an additional insecurity for the payment stream. To remain on the safe side, they will need to assume that the maximum possible curtailment will occur and therefore calculate a significantly lower yearly energy payment. This will lead to a reduced percentage of financing and raise the interest rate. A higher interest rate will then either increase the feed-in tariff rate or make the project infeasible.

Looking at these explanations, it is clear that option 1 - payment for all energy produced - is clearly in the interest of the utility, rate payers and project developers.

HECO/CEM-IR-14

Please explain how your proposal to require the utility to take all renewable energy generated by a FIT resource regardless of system need assures system balance and stability?

Response: As explained in answer 13, all energy produced has to be paid for. This does not restrict the utility from not using it.

HECO/CEM-IR-15

Is it your position that FIT resources may not be curtailed under any circumstance? If there are circumstances under which a FIT resource may be curtailed, please explain in detail how that curtailment would be accomplished. Please explain in detail how existing renewable projects fit into any curtailment order and the basis for assigning a lower curtailment priority to existing renewable resources.

Response: As explained in answer 13, all energy produced has to be paid for. This does not restrict the utility from not using it.

HECO/CEM-IR-16

Please provide any evaluations, studies or analyses to support the following in your FIT proposal: (1) the inclusion of each renewable resource type; (2) the viability of each renewable resource type for each island system; (3) the project size demarcations for each renewable resource type; (4) the viability of each project size for each island system; and (5) the basis for a different or separate rate for each size demarcation (if applicable). This should include any information or evidence that you may have on the general or specific plans of any renewable resource developer to develop renewable resources of this type, and including the anticipated size of the project, on any island system within the next one, three and five years.

Response: Clean Energy Maui' proposed FIT is modeled after the German feed-in tariff that has proven successful in encouraging the rapid development of large-scale renewable

energy generation at low cost to the public. As a result of the German FIT, Germany now obtains more than 14% of its electricity from renewable sources – primarily wind and solar PV.

The inclusion of each renewable resource type, the project size demarcations for each renewable resource type, and the basis for a different or separate rate for each size demarcation are supported by the following evaluations, studies and analyses showing the success of the same or similar resource types, project size demarcations and rates under the German FIT:

German Federal Environment Ministry, *Development of Renewable Energy Sources in Germany in 2007* (December 15, 2008)

<http://www.bmwi.de/Files/PDF/Entwicklung Erneuerbare Energien.pdf>

World Future Council, *Feed-In Tariffs – Boosting Energy for our Future* (June 2007)

http://www.farmwacht.de/images/stories/WFC_Feed-In_Tariffs_June07.pdf

European Photovoltaic Industry Association, *Supporting Solar Photovoltaic Electricity: An Argument for Feed-in Tariffs* (January 2008)

http://www.eupia.org/Uploads/EPIA_Announcement%20Argument%20for%20Feed-in%20Tariffs.pdf

European Photovoltaic Industry Association, *European PV Association's Position Paper On A Feed-In Tariff For Photovoltaic Solar Electricity* (2005)

<http://www.wired-worlds.org/Feed-In-Tariffs/Europe/Feed-In-Tariff-EPIA.pdf>

European Photovoltaic Industry Association, *Overview of European PV support schemes* (December 17, 2008)

http://www.eupia.org/Uploads/EPIA_documents/20081215_EPIA_PV_support_schemes_summary-PUBLIC.pdf

Paul Gipe, *Renewable Energy Policy Mechanisms* (February 17, 2006)

<http://www.wired-worlds.org/Feed-In-Tariffs/Europe/Feed-In-Tariff-EPIA.pdf>

The viability of each renewable resource type for each island and the viability of each project size for each island system are supported by the following evaluations, studies and analyses:

Douglas Hinrichs, *Feed-in Tariff Case Studies: A White Paper in Support of the Hawaii Clean Energy Initiative* (Sentech, Inc. September 2008).

Global Energy Concepts LLC, *A Catalog of Potential Sites for Renewable Energy in Hawaii* (Department of Business Economic Development and Tourism, December 2006)

<http://hawaii.gov/dbedt/info/energy/publications/200602.pdf>

HECO/CEM-IR-17

Please describe the methodology and rationale used to determine the proposed twenty (20) year terms in your FIT proposal for each technology. Please provide any evaluations, studies or analyses to support the proposed 20 years terms for each technology listed.

Response: The proposed twenty (20) year terms in Clean Energy Maui' FIT Proposal are modeled after the 20-year terms of the German feed-in tariff that has proven successful in encouraging the rapid development of large-scale renewable energy generation at low cost to the ratepaying public. Certainly it is in the interest of the ratepayer to extend the term as long as possible, taking future inflation into account.

HECO/CEM-IR-18

Please provide the bases for the proposed penetration limits for intermittent renewable energy sources. Please provide any evaluations, studies or analyses to support the proposed penetration limits, including in particular any evaluations, studies or analyses regarding the maintenance of system reliability at the proposed penetration limits.

Response: Island-wide grid penetration limits for intermittent renewable energy sources are based on the economic principle that it does not make sense to oblige the utility and ratepayers to pay for renewable energy from intermittent sources (solar and wind) if such sources displace no generation from imported fuels because of the need to maintain such generation to maintain present-day levels of system reliability.

A proposed grid-wide penetration limit of 25% of peak demand for wind energy is based on studies³ showing that the additional operating costs imposed on the system to maintain system reliability are moderate (from \$3/MWh to \$5/MWh) at wind capacity penetrations ranging up to 29%. However, studies from Ireland suggest that penetrations up to 54% may be possible. These studies are at: <http://www.dcenr.gov.ie/Energy/North-South+Co-operation+in+the+Energy+Sector/All+Island+Electricity+Grid+Study.htm>

A proposed aggregate island-wide penetration limit of 20% of peak demand for photovoltaic solar power is based on a studies⁴ showing that, at minimum system loading

³ See B. Parsons, M. Milligan, J.C. Smith, E. DeMeo, B. Oakleaf, K. Wolf, M. Schuerger, R. Zavadil, M. Ahlstrom and D. Yen Nakafuji, "Grid Impacts of Wind Power Variability: Recent Assessments from a Variety of Utilities in the United States," National Renewable Energy Laboratory Conference Paper NREL/CP-500-39955 (July 2006) <http://www.nrel.gov/docs/old/2006/39955.pdf>; J.C. Smith, B. Parsons, T. Acker, M. Milligan, R. Zavadi, M. Schuerger and E. DeMeo, "Best Practices in Grid Integration of Variable Wind Power: Summary of Recent US Case Study Results and Mitigation Measures," presented at Europe Wind Energy Conference '07, Milan Italy (May 2007).

⁴ See P. Denholm and R. Margolis, "Very Large-Scale Deployment of Grid-Connected Solar Photovoltaics in the United States: Challenges and Opportunities," National Renewable Energy Laboratory Conference Paper NREL/CP-620-39683 (April 2006) <http://www.nrel.gov/docs/old/2006/39683.pdf>; Paul Denholm and

of 35%, increasingly large amounts (> 50%) of photovoltaic electricity are unusable as PV penetration exceeds 20% of peak demand. However, in the future these limits may be increased as new technologies become available.

HECO/CEM-IR-19

Please explain in detail how the proposed queuing procedures based upon those procedures proposed by the Midwest ISO would operate and be implemented for each island electric system. In particular, please provide any evaluations, studies or analyses of potential differences between the Midwest ISO service territory and the Hawaii utility electric systems and how those differences would be accommodated and addressed through your FIT proposal. Please discuss in detail whether the quality of power (steadiness, predictability, ability to enhance regulating resources on the grid and other such characteristic that are important to power reliability) should be a factor in setting the priority a project receives, and if not, why not.

Response: The Midwest ISO queuing procedure⁵ could operate and be implemented for each island electric system without significant modification.

Power quality and power reliability are factors affecting whether a project meets the utility's technical requirements for interconnection and, therefore, whether it is "ready-to-interconnect," but should not themselves be a factor in determining the priority that a project receives under the utility's queue management procedure for interconnection.

HECO/CEM-IR-20

Should a utility be entitled to use the generated output of a renewable resource in its service territory toward meeting a state or county mandated RPS standard regardless of ownership of the environmental credits? If not, please discuss why not?

Response: No. The developer who took the risk in developing the renewable energy project is entitled to the rewards of the project, including the value of any environmental credits associated with the project in any market set up for the exchange of such credits. If the utility is under a state mandate to achieve certain levels of renewable energy production, then the utility should have the opportunity to develop its own renewable

Roberet M. Margolis, "Evaluating the limits of solar photovoltaics (PV) in traditional electric power systems," 35 Energy Policy 4424-4433 (Elsevier, September 2007).

⁵ See Midwest Independent Transmission System Operator ("Midwest ISO"), Generator Interconnection Process Tariff (August 25, 2008)

; Midwest ISO, Business Practices Manual: Generator Interconnection (Manual No. 15, TP-BPM-004-r2, January 6, 200p)

; 124 FERC ¶ 61,183, Midwest Independent Transmission System Operator, Inc., Docket No. ER08-1169-000, Order Conditionally Accepting Tariff Revisions and Addressing Queue Reform (August 25, 2008)

; Working group for Investment in Reliable & Economic electric Systems (WIRES), Integrating Locationally-Constrained Resources Into Transmission Systems: A Survey of U.S. Practices (October 2008)

energy projects that, under Clean Energy Maui's FIT proposal, would be eligible for FIT rates on the same terms as renewable energy projects developed by independent developers.

HECO/CEM-IR-21

Please provide any evaluations, studies, analyses or data to support the rates contained in your FIT proposal including detailed support for the applicability of those rates to the specified resources on the Hawaii utilities' island systems.

Response: See Clean Energy Maui's Response to the IRs Submitted by DBEDT, DBEDT/CEM-IR-1.

HECO/CEM-IR-22

Please explain how your proposed rates are affected by the key costs and operating characteristics referenced in the Commission's NRRI Scoping Paper filed December 11, 2008.

Response: The key costs and operating characteristics referenced in the Commission's NRRI Scoping Paper are relevant, but not determinative of the incentive FIT rate that attracts investment necessary to achieve rapid development of large-scale renewable energy generation at low cost to the public. Figures for these key costs and operating characteristics set a lower bound on the desired FIT rate, but do not account for risks, delays, legal and regulatory uncertainties, and the willingness or unwillingness of the utility and the Consumer Advocate to play by the rules. Investors have to take all such risks into account, and will take all such risks into account, in deciding whether to fund the development of renewable energy projects in Hawaii.

In addition to figures for these cost and operating characteristics, the Commission can and should ask the renewable energy industry participants for good faith estimates of the incentive FIT that would attract such development capital. Nobody will know, however, if the Commission got the FIT rate right until it is seen, after 2 to 3 years, how much renewable energy generating capacity has been called forth by the FIT rate.

HECO/CEM-IR-23

Please provide any evaluations, studies, analyses or data to support your assertion that a "German-style feed-in tariff is Hawaii's best and only chance to achieve and exceed RPS goals."

Response: International comparisons clearly show that a German style FIT has vastly superior effects than any other support measure for renewable energy. As we are expecting a 40% goal by 2030, it is clear that business-as-usual will not get us there. There is no evidence that RPS based schemes will lead to rapid development of large scale renewable developments.

HECO/CEM-IR-24

Please provide any evaluations, studies, analyses or data to support your assertion that “[i]n order to work a FIT needs to be free of caps....”

Response: The Clean Energy Maui FIT Proposal is modeled after the German feed-in tariff that has proven successful in Germany for achieving 14% renewable electricity generation production in 7 years at a cost to German ratepayers of about \$.01/kWh. The German feed-in tariff is not limited by annual caps, production or output caps (curtailment), size caps or expenditure caps.

HECO/CEM-IR-25

Issue 1 – Please provide any evaluations, studies, analyses or data to support your assertion that “[w]ith a correctly designed FIT, Hawaii will see billions of dollars of renewable investments.”

Response: Clean Energy Maui’ FIT proposal is derived from the German model. Germany has 50% of all worldwide wind power installations and 50% of all worldwide solar power installations. Coming from Germany, I can assure you that Germany has less than half the sunshine and wind power than Hawaii. Clearly, many of these investors would take advantage of the better conditions in Hawaii. Another indicator is the large interest (70 parties?) in HECO's 100 MW renewable RFP.

HECO/CEM-IR-26

Please explain in detail your statement that “Hawaii will see the rise of a renewable energy sector many times the size of the current electric utilities” and provide any evaluations, studies, analyses or data to describe the potential impacts on grid reliability that would result from such a level of renewable resources on the island electrical systems and how you would mitigate those impacts.

Response: If Maui's electricity were made entirely from renewable resources, it would require an investment of \$1 to 1.5 billion. This is just a rough figure, but if the existing wind farm costs \$70 million to build and supplies 10% of the energy, then it would cost \$700 million to have a wind farm sized for 100% of Maui's energy. Clearly, it would need storage, ancillary power and some diversification, which will bring the cost to over \$1 billion. That's 5 to 10 times the market value of Meco. I assume that similar calculations could be made for the other islands. Considering the size of such an investment, it might be advantageous to plan a completely new energy production infrastructure rather than trying to integrate the legacy diesel generators.

HECO/CEM-IR-27

Please provide any evaluations, studies, analyses or data which compare the feed-in tariff design adopted in Germany with the FIT proposals in this docket; specifically, please describe any constitutional, legal, regulatory or political requirements or directives relating to renewable energy which differ between the two jurisdictions.

Response: Clean Energy Maui' FIT proposal is derived from the German model. Certainly there are differences between the jurisdictions and the setup of the energy market. The beauty of the FIT is that it is designed to activate financial resources, and these use the same mathematics all over the globe.

HECO/CEM-IR-28

Please describe in detail your efforts to contact international experts to define a FIT rate for grid-stabilizing measures, such as storage, and please provide the results of your efforts.

Response: Clean Energy Maui has researched this issue on the Internet and contacted at least 5 experts. Since few countries have reached high levels of penetrations, such rates have not been established. However, I am in contact with Ecofys GmbH in Berlin and they are part of a large working group in the Federal Renewable Energy Ministry. There are several concepts being worked on that will modify the FIT to include grid-stabilizing measures:

- 1) Time of use differentiation. Energy produced at peak times will be bought at a 2 Eurocents higher rate. This encourages bioenergy producers to install more generators and shift production to peak time.
- 2) Technology combination. Wind farms that coordinate output with bioenergy producers in a way that smoothes power output will get a 2 Eurocent/kWh bonus.
- 3) Technology bonus. Battery systems connected to the grid will be paid a FIT rate that guarantees a bonus for the investor.

One addition to the FIT in Germany is the improvement of the short-time stability of wind power. Germany is introducing new quality descriptions that will require circuitry like capacitor banks inside wind farms. Increasing the rate for wind by 0.5 Eurocents per kWh will pay for the additional cost. Existing installations can get higher rates, if they upgrade.

HECO/CEM-IR-29

Please quantify the "relatively enormous additions to generating capacity from a particular RE technology that could result if the rate for that particular technology was set too high.

Response: Spain set its rates too high and generated 25% annual profits for investors. This created a rush on installations, such that the 4-year goal was fulfilled in under a year. While this is not a bad thing, it created market insecurity when the Spanish government backed off for a while and many solar projects were left hanging.

Responses by Clean Energy Maui to IRs of Tawhiri

TPL/ZEL-IR-9

If utility generation is allowed to participate in Feed-in Tariffs (collectively "FiT"), are you proposing any safeguard to avoid a potential conflict of interest or appearance of conflict of interest with that arrangement? If so, please explain in detail what would be those safeguards? If not, please explain how the integrity of the FiT will be maintained under that scenario.

Response: Yes. The Proposal for Feed-in Tariff submitted by the Clean Energy Maui ("Clean Energy Maui's FIT Proposal") avoids potential conflict of interest or appearance of conflict of interest by (1) obliging the utility, as a transmission & distribution entity, to take, purchase and pay for renewable energy delivered by a renewable energy generator owned by the utility on the same terms as renewable energy delivered by an independent renewable energy generator, and (2) establishing a queueing procedure for interconnection priority that is uniformly applicable to renewable energy generators owned by the utility and independent renewable energy generators. Still, utility participation in the FIT may create conflict if it is not accompanied by uniform, easy to follow interconnection rules and if there should be any caps.

* * * *

DATED: Kihei, Hawaii, March 12, 2009



Chris Mentzel
Chief Executive Officer

CLEAN ENERGY MAUI LLC

CERTIFICATE OF SERVICE

I hereby certify that I have this date filed and served the original and eight copies of the foregoing **RESPONSES OF CLEAN ENERGY MAUI LLC TO INFORMATION REQUESTS OF DEPARTMENT OF BUSINESS ECONOMIC DEVELOPMENT AND TOURISM, HECO COMPANIES AND TAWHIRI POWER LLC** in Docket No. 2008-0273, by mail delivery to the Commission at the following address:

CARLITO CALIBOSO
PUBLIC UTILITIES COMMISSION
465 S. King Street, Suite 103
Honolulu, HI 96813

I hereby further certify that I have this date served two copies upon the following party of the foregoing **RESPONSES OF CLEAN ENERGY MAUI LLC TO INFORMATION REQUESTS OF DEPARTMENT OF BUSINESS ECONOMIC DEVELOPMENT AND TOURISM, HECO COMPANIES AND TAWHIRI POWER LLC** in Docket No. 2008-0273, by mail addressed to:

CATHERINE P. AWAKUNI
DEPARTMENT OF COMMERCE AND CONSUMER AFFAIRS
DIVISION OF CONSUMER ADVOCACY
P.O. Box 541
Honolulu, HI 96809

I hereby further certify that I have this date served one copy upon each of the following parties, of the foregoing **RESPONSES OF CLEAN ENERGY MAUI LLC TO INFORMATION REQUESTS OF DEPARTMENT OF BUSINESS ECONOMIC DEVELOPMENT AND TOURISM, HECO COMPANIES AND TAWHIRI POWER LLC** in Docket No. 2008-0273, by causing each such copy thereof to be sent via e-mail in a portable document format ("pdf") to each such party as follows:

DARCY L. ENDO-MOTO
VICE PRESIDENT
GOVERNMENT & COMMUNITY AFFAIRS
HAWAIIAN ELECTRIC COMPANY, INC.
P.O. Box 2750
Honolulu, HI 96840-0001

DEAN MATSUURA
DIRECTOR, REGULATORY AFFAIRS
HAWAIIAN ELECTRIC COMPANY, INC.
P.O. Box 2750
Honolulu, HI 96840-0001

JAY IGNACIO
PRESIDENT
HAWAII ELECTRIC LIGHT COMPANY, INC.
P.O. Box 1027
Hilo, HI 96721-1027

EDWARD L. REINHARDT
PRESIDENT
MAUI ELECTRIC COMPANY, LIMITED
P.O. Box 398
Kahului, HI 96733-6898

THOMAS W. WILLIAMS, JR., ESQ.
PETER Y. KIKUTA, ESQ.
DAMON L. SCHMIDT, ESQ.
GOODSILL ANDERSON QUINN & STIFEL
Alii Place, Suite 1800
1099 Alakea Street
Honolulu, HI 96813

ROD S. AOKI, ESQ.
ALCANTAR & KAHL LLP
120 Montgomery Street, Suite 2200
San Francisco, CA 94104

Attorneys for HAWAIIAN ELECTRIC COMPANY, INC.,
MAUI ELECTRIC COMPANY, LIMITED and
HAWAII ELECTRIC LIGHT COMPANY, INC.

MARK J. BENNETT, ESQ.
DEBORAH DAY EMERSON, ESQ.
GREGG J. KINKLEY, ESQ.
DEPARTMENT OF THE ATTORNEY GENERAL
425 Queen Street

Honolulu, HI 96813

Counsel for DEPARTMENT OF BUSINESS, ECONOMIC
DEVELOPMENT AND TOURISM

CARRIE K.S. OKINAGA, ESQ
GORDON D. NELSON, ESQ.
DEPARTMENT OF CORPORATION COUNSEL
CITY AND COUNTY OF HONOLULU
530 S. King Street, Room 110
Honolulu, HI 96813

Counsel for the CITY AND COUNTY OF HONOLULU

LINCOLN S.T. ASHIDA, ESQ.
WILLIAM V. BRILHANTE, JR., ESQ.
MICHAEL J. UDOVIC
DEPARTMENT OF THE CORPORATION COUNSEL
COUNTY OF HAWAII
101 Aupuni Street, Suite 325
Hilo, HI 96720

Counsel for the COUNTY OF HAWAII

HENRY Q. CURTIS
KAT BRADY
LIFE OF THE LAND
76 North King Street, Suite 203
Honolulu, HI 96817

CARL FREEDMAN
HAIKU DESIGN & ANALYSIS
4324 Hana Highway
Haiku, HI 96708

WARREN S. BOLLMEIER II
PRESIDENT
HAWAII RENEWABLE ENERGY ALLIANCE
46-040 Konane Place, # 3816
Kaneohe, HI 96744

DOUGLAS A. CODIGA, ESQ.
SCHLACK ITO LOCKWOOD PIPER & ELKIND
Topa Financial Center
745 Fort Street, Suite 1500
Honolulu, HI 96813
Counsel for BLUE PLANET FOUNDATION

MARK DUDA
PRESIDENT
HAWAII SOLAR ENERGY ASSOCIATION
P.O. Box 37070
Honolulu, HI 96837

RILEY SAITO
THE SOLAR ALLIANCE
73-1294 Awakea Street
Kailua-Kona, HI 96740

JOEL K. MATSUNAGA
HAWAII BIOENERGY, LLC
737 Bishop Street, Suite 1860
Pacific Guardian Center, Mauka Tower
Honolulu, HI 96813

CLIFFORD SMITH
MAUI LAND & PINEAPPLE COMPANY, INC.
P.O. Box 187
Kahului, HI 96733-6687

KENT D. MORIHARA, ESQ.
KRIS N. NAKAGAWA, ESQ.
SANDRA L. WILHILDE, ESQ.
MORIHARA LAU & FONG LLP
841 Bishop Street, Suite 400
Honolulu, HI 96813

Counsel for HAWAII BIOENERGY, LLC
MAUI LAND & PINEAPPLE COMPANY, INC.

THEODORE E. ROBERTS
SEMPRA GENERATION
101 Ash Street, HQ 10
San Diego, CA 92101-3017

JOHN N. REI
SOPOGY, INC.
2660 Waiwai Loop
Honolulu, HI 96819

GERALD A. SUMIDA, ESQ.
TIM LUI-KWAN, ESQ.
NATHAN C. NELSON, ESQ.

CARLSMITH BALL LLP
ASB Tower, Suite 2200
1001 Bishop Street
Honolulu, HI 96813

Counsel for HAWAII HOLDINGS, LLC, dba FIRST WIND HAWAII

ERIK KVAM
CHIEF EXECUTIVE OFFICER
ZERO EMISSIONS LEASING LLC
2800 Woodlawn Drive, Suite 131
Honolulu, Hawaii 96822

HARLAN Y. KIMURA, ESQ.
Central Pacific Plaza
220 South King Street, Suite 1660
Honolulu, HI 96813

Counsel for TAWHIRI POWER LLC

SANDRA-ANN Y.H. WONG, ESQ.
ATTORNEY AT LAW, A LAW CORPORATION
1050 Bishop Street #514
Honolulu, HI 96813

Counsel for ALEXANDER & BALDWIN, INC., through
its division, HAWAIIAN COMMERCIAL & SUGAR COMPANY

DATED: Kihei, Hawaii, March 12, 2009


CHRIS MENTZEL